INDIA'S SOFTWARE EXPORTS: GROWTH AND IMPORT INTENSITY

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India's software exports as a percentage of total exports have increased from 2.37 percent in 1994-95 to 16.5 percent in 2001-02. The share of Information Technology (IT) and Information Technology Enabled Services (ITES) industry in India's GDP is expected to increase from present 1.4 percent to 7 percent by 2008. IT and ITES exports currently account for 8 percent of foreign exchange inflows and is expected to increase to 30 percent in 2008. The present paper attempted to analyse India's software exports focusing on two aspects: i) the growth of software exports, and, ii) the import intensity of software exports. The major findings of the study are: (i) government initiatives particularly infrastructural support have played a significant role in improving the export performance, (ii) the import intensity of exports is very high for software exporting firms.

I. INTRODUCTION

Indian Software exports have shown phenomenal growth over many years. Software development and service industry is the fastest growing industry in India. The share of Information Technology (IT) and Information Technology Enabled Services (ITES)[1] industry in GDP is expected to increase from present 1.4 percent to 7 percent in the year 2008. The industry is expected to employ by 2008 about 4 million people. IT and ITES exports currently account for 8 percent of foreign exchange inflows and is expected to grow to 30 percent in 2008. However, India's share in $300 billion world's software and service industry is less than 1 percent (Bajpai and Shastri, 1998). The software exports as a percentage of total exports have increased from 2.37 percent in 1994-95 to 16.5 percent in 2001-02.Country's top five IT companies are among the most profitable and have highest market capitalization among all full fledged IT service companies in the world[2].

Government initiatives in the software industry are very much present since 1984 particularly after 1990. It included policy initiatives, fiscal concessions, import and export incentives, setting up of infrastructural facilities, etc. Though the industry has been successful in increasing the exports over the years, the recent years have witnessed a slowdown in the rate of growth of software exports causing great concern. Slowdown of US economy, expected competition from countries like China, peculiar structure of Indian software exports, increasing import content of software exports, etc, have caused lot of

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1. Information technology enabled services include call centers, medical transcription, data digitization, legal data bases, revenue accounting, data processing, bank office operations, web- content development, animations, etc, see NASSCOM report, 1999-00, www.nasscom.com.

2. Top five companies are infosys, HCL technologies, Satyam, TCS and Wipro, see Economic Times, 16th October, 2002.

discussion in the industrial and academic circles about the future of India's software exports. In this context, the present paper attempts to analyse India's software exports focusing on two aspects: i) the growth of software exports, and, ii) the import intensity of software exports.

II. SOFTWARE EXPORTS: A THEORETICAL BACKGROUND

The present paper discusses the export of software services from India within the theoretical framework of trade in services. Trade in services may be defined as international transactions in services between the residents of one country and the residents of another country irrespective of where the transaction takes place. International trade in services may be classified into four categories (Nayyar, 1995): (i) those in which producer moves to the consumer,(ii)those in which consumer moves to the producer, (iii)those in which either producer or consumer move to the other,(iv) those in which neither producer nor consumer move to each other. In the first three categories, physical proximity of producer and consumer is essential. In the last category physical proximity is not essential.

Trade in software services is carried out mainly through (i) on-site services, (ii) offshore services, and (iii) offshore products and packages. This classification is based on the movement of producer of a service and its consumer. On-site services are known as 'body shopping'[3] in which the producer of software services moves to the consumer (Sen, 1995). It occurs when software professionals move to the site of the consumer to provide software related services. In the case of offshore services, there is only limited movement of producer of the service and the consumer of the service because the software is developed offshore and exported to the users. In the case of offshore packages or software product development neither producer nor the consumer of the service moves (Joseph and Harilal, 2001).

Although services currently make up over 60 percent of World's production, they account for only about 20 percent of World trade (Freund and Weinhod, 2002). However, last one and a half decade witnessed tremendous increase in the trade in services at the global level. The rate of growth of trade in service has been higher than the rate of growth of merchandise trade. Indian case is also not different from this. India's service exports also grew phenomenally over the same period. Last year, the share of service exports in total exports of India was 26.7 percent. India's service exports increased at the rate of 12.4 percent during 1990-99, compared to 7.8 percent of world exports (Raipuri, K, 2001). India's share in world exports of services has increased from .57 to .99. One of the reasons for the better performance of service exports is the performance of India's IT industry by way of exports of software.

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3. Body shopping is a term used when software professionals are found for employment by foreign companies which is different from on-site services where software professionals are sent to work at the clients premises by an Indian company for a specific job, Sen P (1995).

III. GROWTH OF SOFTWARE EXPORTS: AN ANALYSIS

Software exports have shown rapid increase since 1980.Though software exports began in 1974 it made limited impact till 1980. The exports have jumped from US$ 4 million in 1980 to 7300 million in the year 2001-2002. The high growth of software exports has helped our country to record a current account surplus in BOP for the first time in 23 years[4].

There is lot of difference in the growth of software exports in dollar terms and in rupee terms. The ratio of rupee terms to dollar terms of software export earnings has moved from 14.4 in 1987-88 to 47.5 in 2001-02. It implies that the export earnings in rupee terms in 1987-88 was just 14.4 times of dollar terms have increased in such way that in 2001-02 it is 47.5 times of dollar terms. This ratio in fact represents the exchange rate of rupee in terms of dollar.

To analyse the growth in the software exports an econometric method is followed. A semi-log model of the form $\ln Y_t = \beta_1 + \beta_2 t + u_t$ (Gujarati, D.N,1995) is estimated separately for export earnings in dollar terms and rupee terms for the period 1987-88 to 2001-02 and separately for sub periods 1987-88 to 1993-94 and 1994-95 to 2001-02. From the estimated β value compound growth rates are calculated[5]. The results are presented in Table-1 and Table-2.

Table-1 .Growth Rates of Software Exports in Rupee Terms

Period	b_1	b_2	Compound Growth Rate	Adjusted R^2
1987-88 to 2001-02	3.77	0.455		
	(98.13)*	(107.63)*	0.58	0.99
1987-88 to 1993-94	3.83	0.440		
	(72.10)*	(37.00)*	0.55	0.99
1994-95 to 2001-02	3.63	0.467		
	(27.00)*	(40.76)*	0.60	0.99

Figures in Parenthesis are 't' values
** Significant at 1 percent level*

4. High growth of software exports and growth in private transfers and service exports helped India to achieve a current account surplus, Economic Times, July 1st , 2002.

5. β_2 of the growth model gives instantaneous rates of growth and not the compound rate of growth. Compound growth rates have been derived from the estimated β_2 values by using the formula $e^{\beta-1}$

The growth rates of software exports given in the Table-2 reveal that during the period 1987-88 to 2001-02, the software exports witnessed a compound growth rate of 58 percent. The period wise analysis showed that the growth rate for the period 1987-88 to 1993-94 is 55 percent and for the period 1994-95 to 2001-02 it is 60 per cent. This reveals that the later period showed higher growth in software exports compared to the earlier period. The explanatory power of the model as given by adjusted R^2 is very good. The β coefficient is statistically significant at 1 percent level.

Table-2: Growth Rates of Software Exports in Dollar Terms

Period	β_1	β_2	Compound Growth Rate	Adjusted R^2
1987-89 to 2001-02	3.40	0.367		
	(43.89)*	(43.00)*	0.44	0.99
1987-88 to 1993-94	3.62	0.29		
	(76.32)*	(27.10)*	0.34	0.99
1994-95 to 2001-02	2.94	0.407		
	(25.12)*	(40.81)*	0.50	0.99

Figures in Parenthesis are 't' values
** Significant at 1 percent level*

Table-2 exhibits that the growth rates of software exports in dollar terms for the whole period is only 44 percent. The period wise analysis shows that for the first period it is 34 percent and for the later period it is 50 percent. The results are very good as far as adjusted R^2 and t values are concerned. The β coefficients are statistically significant at 1 percent level in all cases. The growth rate in dollar terms actually shows the real rate of growth. The comparison of Table-1 and Table-2 provides some interesting findings. Though growth rates in general are high, the growth rate under rupee terms (58%) is much higher than under dollar terms (44%) for the whole period analysis. This may be mainly due to the sudden devaluation of rupee by about 20 percent in 1991[6] and the liberalized exchange rate regime followed since 1991. The period wise analysis shows that in both the cases(rupee terms as well as dollar terms) the growth rate in the second period is higher than the growth rate in the first period. This may be due to more serious government initiatives in the form of infrastructural support during the same period. By 1994-95 many Software Technology Parks (STPs)[7] started functioning in our country

6. If rupee, on the hand, appreciates software exporters make losses. Due to appreciation of rupee by 1.5 percent , Satyam incurred a financial loss of Rs 15.67 croes in September, 2002, Economic Times, *November 1st 2002.*

7. STPs are similar to free trade zones exclusively for software sector established mainly to provide services to the users who undertake software development for export purposes.

and there were around 246 units in various STPs. The results of period wise analysis also revealed that the effect of fall in the value of rupee on software export earnings has come down as can be seen from the differences in growth rate in the first period(55% and 33%) and second period (60% and 50%) between rupee terms and dollar terms earnings. The real growth of software exports by 50 percent in the second period is very encouraging.

The growth rate analysis doesn't fully reveal the significance of the software exports growth in India's total exports. This may be captured if we examine the growth of share of software exports to India's total exports. The share of software exports in the total exports of the country has gone up from 2.37 percent in 1995-96 to 16.5 percent in 2001-02. The software exports have emerged as one of major items of export contributing a major share. Its share is projected to increase to 30 percent by 2008. The present share of 16.5 percent is made possible because of high annual average growth rate of above 50 percent over a decade.

The growth of India's software exports is the result of the competitive advantage we have over other countries. The country has highly skilled English speaking software professionals available at a lesser cost. Probably no other country in the world including China can boast of this. Government initiatives have helped to make use of our competitive advantage.

IV. IMPORT INTENSITY OF SOFTWARE EXPORTS: AN ANALYSIS

The real benefit of software exports to our economy depends on net exports and not on gross exports. We have been successful in pushing our software exports. However, the exports have also increased the imports of software industries. If imports increase along with exports, the favourable effects of software exports on our economy will be less. Therefore, it is necessary to analyse the export–import relationship of our software industry. Available data shows that more than 50 percent of our export earnings are spent for import of inputs for software exports (Joseph and Harilal, 2001).

In this paper an econometric analysis of import intensity of exports is attempted using the data for the year 2000-2001, 2001-02 and 2002-03 for a sample of 15 software exporting firms from each year[8]. The model used is a log-log model **(Model-I)** taking imports as dependent and exports as independent variables. The model is estimated for the whole three years and separately for each year. In order to test the differences in import intensity of exports of large and small firms, a model based on dummy variable **(Model-II)** is also used (Johnston and Dinardo1997).

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8. Data is collected from Economic Times Intelligence Group, ET survey of 100 large private companies. See Thushar Mhanti, Economic Tims, September 30, 2002 and Thushar Mahanti, Economic Times, July 28th, 2003. Software companies are selected from those 100 large companies.

Model-I:

$\ln Imp_t = \beta_1 + \beta_2 \ln Exp_t + u_t$

ln Imp = logarithm of imports (inRs crores)

ln Exp= logarithm of exports (in Rs Crores)

Model-II:

$\ln Imp_t = \beta_1 + \beta_2 \ln Exp_t + D1 + u_t$

ln Imp = logarithm of imports (in Rs crores)

ln Exp= logarithm of exports (in Rs Crores)

D1= dummy variable; 1 for large firms and 0 for small firms

The results of the econometric analysis is given in Table-3 and Table-4.

Table-3 Import Intensity of Software Exports

Model/ Period	β_1	β_2	Adjusted R^2	DW	N
Model–1:	-1.01	1.02			
2000-01 to 2002-03	(-2.178)	(12.90)*	.79	2.18	45
2000-2001	-1.38	1.08			
	(-1.42)	(6.69)*	.76	1.577	15
2001-02	-0.628	0.966			
	(-0.915)	(8.57)*	.84	1.15	15
2002-03	-1.04	1.03			
	(-1.19)	(6.38)*	.75	2.56	15

Figures in parenthesis are t values

** Significant at 1 percent level*

In the Table-3, β_2 coefficients, which show the relationship between imports and exports at different periods, are statistically significant. The adjusted R^2, the explanatory power of the model, is also good. D.W. statistics reveal that there is no presence of autocorrelation. For the whole period (2000-01 to 2002-03) analysis the β_2 value 1.02 shows that if there is 100 percent increase in exports the imports will increase by 102 percent. Similarly for the period 2000-01, if exports increase by 100 percent import will increase by 108 percent. The β coefficient is slightly less for the period 2001-02. Here if exports increase by 100 percent imports will increase by 96 percent. For the year 2002-03, the value of the β_2 coefficient is 1.03 revealing higher growth of imports than exports.

Table-4: Import Intensity of Exports: Large Scale and Small Scale firms

Model/Period	β_1	β_2	D1	Adjusted R^2	DW	N
Model –2:						
2000-01 to 2002-03	-0.870	0.99	-.09			
	(-1.37)	(7.72)*	(-.29)	.78	2.16	30
2000-01	-1.31	1.08	.0037			
	(-1.047)	(4.54)*	.009	.74	1.56	15
2001-02	-1.003	1.042	-0.183			
	(-0.983)	(5.49)*	(-0.509)	.83	1.149	15
2002-03	-0.12	0.82	0.79			
	(-0.072)	(2.15)**	(.63)	.73	2.35	15

Figures in parenthesis are t values
**Significant at 1 percent level, **Significant at 5 percent level.*

Table-4 gives the results of regression model-II, which is based on dummy variable. Here also the results are satisfactory as the R^2 is quite high and β values are statistically significant as the t values are significant at 1 percent level. The coefficients of dummy variable is statistically insignificant implying that there is no difference between large and small firms regarding import intensity of exports. This is same for year-wise analysis and single period analysis. DW statistic show that, there is no presence of autocorrelation. Therefore, the existing structure of dominance on large firms is not going to affect the volume of imports. One major reason for the import-intensity of our software exports is that software industry is fully export oriented. Software industry in India can be divided into export sector and domestic sector (Bajpai and Shastri,1998). However, the domestic sector is not very strong and depends on other countries for its input requirements leading to high import–intensity.

VII. CONCLUDING REMARKS

The paper tried to analyse the growth and import intensity of India's software exports. Results show that, growth of software exports is very high since 1987-88. This can be attributed to the government initiatives since 1984. The results also show that the recent period 1994-95 to 2001-02 has witnessed a higher growth rate compared to the period 1987-88 to 1993-94. This lead us to the conclusion that the government initiatives in the form infrastructural support through STPs have been more effective promoting software exports. The share of software exports from STPs has increased significantly since 1994-95. Though the growth of software exports in rupee terms is higher than the dollar terms, period wise analysis show that, the gap is coming down. Annual compound growth rate of 50 percent in dollar terms in recent years reveals the strength of our software exports.

The study reveals the import-intensity of our software exports. The imports are growing at much higher rate than the growth in exports. Since the import intensity is already 50 percent of the total exports, this should be a serious concern as it would bring down the real benefit of India's software exports. It may be argued that this situation has occurred mainly because of India's export oriented growth strategy. The domestic sector of India's Information Technology industry is weak compared to export sector. If we can develop this area in India, the imports will come down.

The study has few policy implications in guiding the future growth of India's software exports. The government initiatives in the form of infrastructral support are vital for software exports and it should be continued at a much bigger scale. The sustainability of our exports would depend on this. It may be suggested that the state governments must take more efforts in this endeavor as like Karnataka and Andra Pradesh. Since import-intensity of software exports are high, efforts should be made to develop domestic sector of India's software industry.

REFERENCES

Bajpai Nirupam and Vanitha Shastri (1999): "Software Industry in India: A case Study", Harvard Institute for International Development, Discussion Paper No.667.

Freund C and Diana Weinhold (2002): Internet and International Trade in Services, *American Economic Review*, Vol 92, No.2 pp 236-240

Gujarathi, D.N (1995): "Basic Econometrics," Macgraw Hill, Newyork

Johnston, J and John Dinardo (1997): "Econometric Methods", Macgraw Hill, Newyork

Joseph, K.J and K.N.Harilal (2001): "Structure and Growth of India's IT Exports: Implications for an Export Oriented Growth Strategy," *Economic and Political Weekly*, Vol 34 No.34, pp 3262-70

Nayyar, D (1995) : International Trade in Services: Implications for Developing Countries, in Kalyan Banerji and Taranjani Vakil (Eds) *India Joining the World Economy*, Tata Macgraw Hill, New Delhi.

Raipuri, K (2001): Service Exports: Knowledge Bowl Yet to Yield Major Gains, *Economic and Political Weekly*, Vol.34 No.35, pp 3351-52.

Sen, P (1995) : "Indian Software Exports: An Assessment," *Economic and Political Weekly*, Vol.30, Nos 7 and 8, pp 2053-58.